PATENT SPECIFICATION 1,066,442

DRAWINGS ATTACHED.

Inventor:—HENRY JAMES BUTLER.

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COMPLETE SPECIFICATION.

Improvements in Disc Brakes.

We, DUNLOP RUBBER COMPANY LIMITED, a British Company of 1, Albany Street, London, N.W.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to disc brakes and more particularly relates to self-energising or servo disc brakes of the kind comprising a rotatable disc and at least one non-rotatable friction element which is constrained to move in a path inclined to the braking surface of the disc in such a manner that a servo effect is obtained when the brake is applied and the disc is rotating in a direction corresponding to forward movement of the vehicle.

It has been proposed that the inclined friction element should be attached to a brake support by a link which pivotally engages the friction element at one end and the support at its other end to constrain the friction element to move in an inclined direction towards the disc.

With an arrangement of this type the degree of self-servo action obtained is dependent upon the angle between the braking surface of the disc and a line passing through the pivot points of the link. Consequently the self-servo action varies throughout the wear life of the friction element because the angle of the link varies proportionally to the thickness of the friction material.

One object of the present invention is to provide a servo disc brake wherein the foregoing disadvantage is largely overcome.

According to the present invention a disc brake comprises a rotatable disc, a non-rotatable support straddling a minor portion of a periphery of the disc, a thrust device attached to the support, a friction element associated with the thrust device and adapted to be moved towards the disc along an axis inclined relative to the plane of the disc, an abutment surface on said support, said surface being parallel to the axis of movement of the friction element to guide said element towards the disc, and a rigid link having one end pivotally connected to the friction element and the other end engageable with the inclined abutment surface in such a manner that it is progressively movable towards the disc along said abutment surface as wear of the friction element occurs.

Three embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 shows a disc brake assembly suitable for use as a rear brake, viewed in an axial direction of the disc, and shown partly in cross-section;

Figure 2 is a radial view of the brake assembly shown in Figure 1 partly in cross-section;

Figure 3 shows an alternative rear brake assembly, viewed in a radial direction of the disc, and

Figure 4 shows an alternative disc brake assembly suitable for use on a front wheel brake.

The self-servo disc brake shown in Figures 1 and 2 comprises a non-rotatable support in the form of a caliper-type housing 10 straddling a minor portion of a periphery of a rotatable brake disc 11. The housing is provided on one side of the brake disc with a cylinder 12 the axis of which is inclined to the plane of the disc at an angle of

[*Price 4s. 6d.*]

With self-servo type disc brakes the difference in the braking force between forward and reverse movement of the vehicle can be in the order of 2:1 which is acceptable with fluid pressure operated brakes but when applied to a mechanically-operated emergency or parking brake this difference can be a great disadvantage.

This disadvantage is largely overcome in the embodiment illustrated in Figure 3 which is basically the same as the embodiment described with reference to Figures 1 and 2 and consequently like reference numerals have been used for like parts.

In this embodiment the inner end of the rigid link 22 is positioned in a groove machined in the thrust plate 17. The pivot pin 23 is rigidly secured to the link 22 and extends in a direction parallel to the adjacent radial direction of the disc 11 to be located in a cam slot 42 formed in the thrust plate 17. The longitudinal axis of the aperture 42 preferably extends at right angles to the axis along which the friction element 15 is constrained to move.

When the brake is actuated by the fluid pressure operated thrust device or the mechanically operated lever mechanism to move the friction element 15 into engagement with the brake disc the reaction on the housing causes the fixed friction element to be pressed against the opposite face of the brake disc. When the disc is rotating in a direction corresponding to forward movement of the vehicle the circumferential drag exerted by the brake disc on the friction elements causes reactions to be set up in the rigid link in the same way as described with reference to the previous embodiment, causing the pressure on the friction elements to be increased.

When the brakes are applied with the disc rotating in a direction corresponding to the reverse movement of the vehicle the drag exerted by the disc on the inclined friction element causes the reaction pin 28 to be forced against the outer surface of the abutment flange 26 and the pivot pin 23 to slide along the cam slot 42 to set up a wedging action between the cam slot and the pivot pin which tends to urge the friction elements against the brake disc with an increased force.

With this arrangement it is possible to obtain a servo force in the reverse direction of travel which is substantially equal to the servo force obtained in the forward direction of travel.

The embodiment illustrated in Figure 4 is more suited for use on the front wheels of motor vehicles since it does not include the mechanically operated emergency or parking brake that has been described with reference to the previous embodiments.

In this embodiment the support is again in the form of a caliper-type housing 10 straddling the brake disc 11 having a fluid pressure operated piston and cylinder mechanism forming a thrust device 43 located on one side of the disc with the axis inclined to the plane thereof. The friction element 20 on the other side of the disc is secured to the housing as previously described.

The inclined friction element 15 together with thrust plate 17 is similar to that described in the previous embodiments but in this case the rigid link 44, which is again pivoted to the thrust plate 17, is provided at the end thereof remote from the brake disc 11 with a cam surface 45 which is adapted to engage the abutment flange 26 formed on the housing 10.

Spring means 46 is again provided between the thrust plate 16 and the rigid link 44 to ensure that the link is maintained at the desired angle to the axis of the thrust device 43 when the brake is in the released position.

In operation the thrust device 43 is pressurised to move the inclined friction element 15 into engagement with the brake disc 11. As the friction element 15 is pressed against the disc the reaction on the housing causes the fixed friction element 20 to be pressed against the opposite side of the disc. The circumferential drag exerted by the disc 11 on the friction elements is sufficient to force the cam surface 45 of the link 44 into engagement with the abutment flange and cause a reaction to be set up therein which will act to press the friction elements against the disc with increased force.

The constructions described herein for attaching the rigid link to the thrust plate and the abutment flange are given by way of example only and are not intended to form a limitation of the present invention, for example in the embodiments shown in Figures 1 to 3 the link could be of cylindrical form and adapted to be slidably engaged in a bore of complementary diameter in the thrust plate.

WHAT WE CLAIM IS:—

1. A disc brake comprising a rotatable disc, a non-rotatable support straddling a minor portion of a periphery of the disc, a thrust device attached to the support, a friction element associated with the thrust device and adapted to be moved towards the disc along an axis inclined relative to the plane of the disc, an abutment surface on said support, said surface being parallel to the axis of movement of the friction element to guide said element towards the disc, and a rigid link having one end pivotally connected to the friction element and the other end engageable with the inclined abutment surface in such a manner that it is

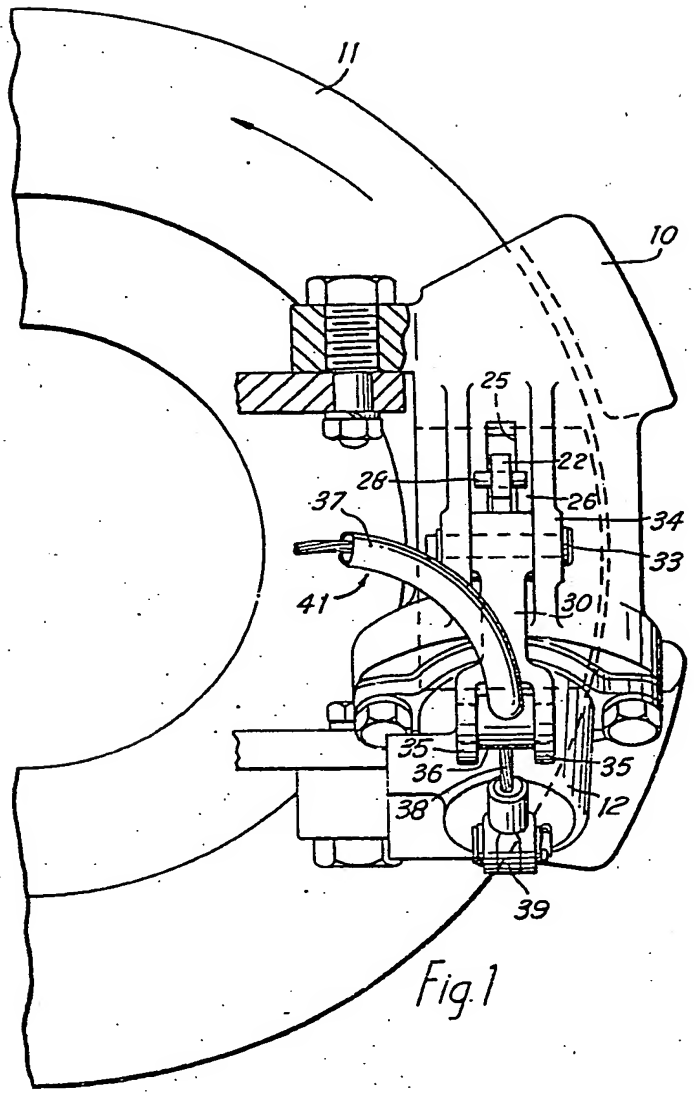

Fig. 1

1066442 COMPLETE SPECIFICATION
4 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheets 1 & 2

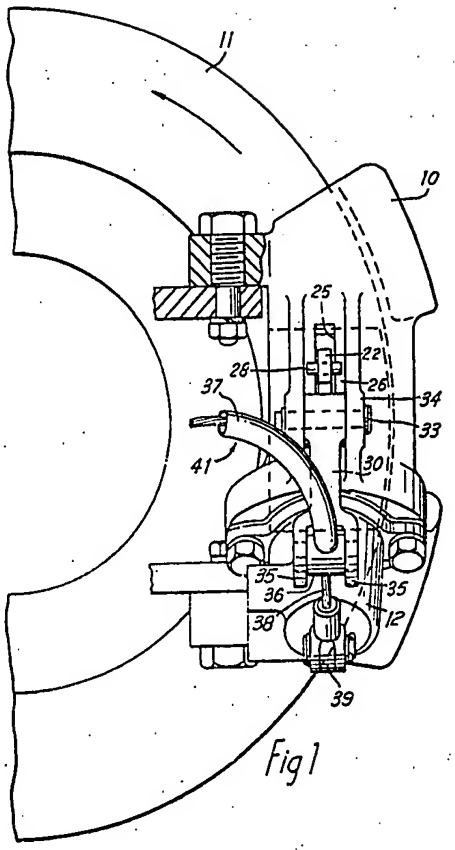

Fig 1

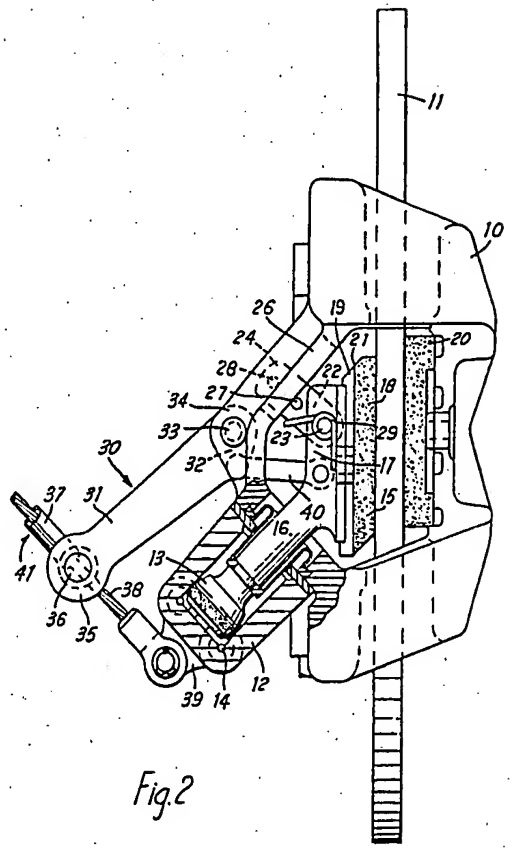

Fig.2

1066442 COMPLETE SPECIFICATION
4 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheets 3 & 4

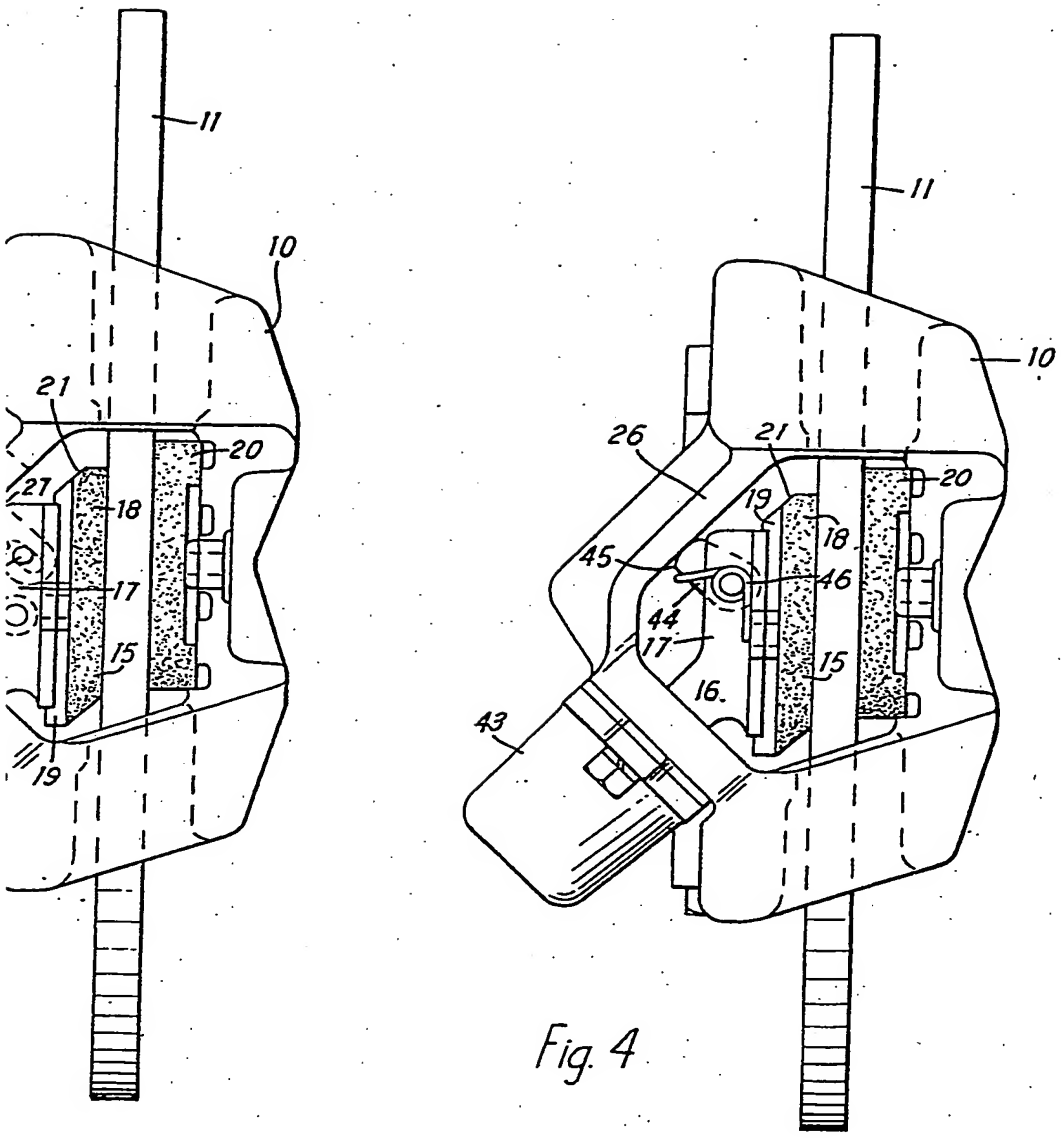

Fig. 4